Background: Although TAVI is becoming a mature technique, the impact of gender difference remains unclear.

Methods: TAVI patients were included prospectively in a dedicated database. The proportion of female patients (131) was similar to male (129). The Edwards valve (85.4%) and CoreValve (14.6%) were used via the transfemoral (65.0%), subclavian (3.1%) or transapical approach (31.9%). All events were defined by the VARC criteria.

Results: Age was similar (83.1±6.3 years), but women had less coronary and peripheral disease and previous cardiac surgery, and higher ejection fraction with a lower EuroSCORE (22.3±9.0 vs 26.2±13.0%, p=0.005). Minimal femoral size (7.74±1.03 vs 8.55±1.34mm, p<0.001), annulus size (20.9±1.4 vs 22.9±1.7mm, p<0.001) and valve size (23.9±1.6 vs 26.3±1.5mm, p<0.001) were smaller in women. Device success was similar (90.8 vs 88.4%, p=0.516) despite increased iliac complication (9.0 vs 2.5%, p=0.030). Kaplan-Meier survival at 1-year was 76% (95%CI, 72-80%) for women vs 65% (95%CI, 60-69%) for men (log-rank p=0.022).

By multivariate analysis, male gender (HR 1.798: 1.004-3.215, p=0.048), previous cardiac surgery (HR 2.299: 1.219-4.336, p=0.010), post-procedural aortic regurgitation (HR 2.261: 1.308-3.909, p=0.004), Transfusion (HR 2.474: 1.319-4.640, p=0.005), acute kidney injury (HR 6.907: 3.085-15.465, p<0.001), and conversion to surgery (HR 5.147: 1.428-18.550, p=0.012) were identified as the predictors for long-term mortality.

Conclusions: Female patients have better baseline clinical characteristics and better survival, and are also identified as an independent predictor of long-term survival in the TAVI cohort.

181

Evaluation of the radiation dose received by the medical team during transcatheter aortic valve implantation

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Background: Transcatheter aortic valve implantation (TAVI) is a growing cardiac intervention, using ionising radiation with deterministic and stochastic effects for the patient as well as for the medical heart team. Operator radiation depends on numerous factors, such as distance to the source, fluoroscopy time, and X ray tube angulation. Lead protection is routinely used for coronary angiography, but is less suitable for use during TAVI, and areas such as the hands and eyes are not systematically protected. We aimed to quantify the radiation dose received by the heart team members during TAVI and evaluate the role of the position of each member.

Methods: Operator radiation was evaluated by means of small dosimeters located on the outside of the lead protection at shoulder, knee and hip. We also measured radiation at the level of the eyes and hands, using small dosimeters that could be mounted on glasses and rings. The whole team was equipped (3 surgeons, 2 interventional cardiologists, 1 nurse and 1 echocardiographer).

Results: 12 TAVI were performed between February and May 2010 (4 apical and 8 femoral access). The most exposed area was the knee for all members of the team. The most exposed member was the surgeon standing closest to the X-ray tube, who received a significantly higher dose than all other team members, and for all areas measured. During a difficult implantation procedure, we observed an alarmingly high dose at the level of the hand (2000 µSv) and the eyes (499 µSv) for this surgeon, who does not have protective glasses and gloves adapted for this procedure at his disposition.

Conclusion: A higher radiation dose was received by the surgeon closest to the X-ray tube during TAVI. Further to this study, we modified our procedure to reduce the radiation dose as much as possible for the medical team, with systematic use of lead protection and glasses, and identification of the fluoroscopy period.

182

Tissue factor expressed by aortic valve interstitial cells is able to generate thrombin in vitro

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Objectives: We recently demonstrated the presence of tissue factor (TF), the main contributor to atherosclerotic plaque thrombogenicity, and thrombin in diseased valve leaflets. TF may be involved in the mineralization process of aortic valves by enhancing the generation of the pro-inflammatory osteopontin (OSP) N-half through thrombin induction. To strengthen our hypothesis, we evaluated TF expression by cultured valve interstitial cells (VICs) and studied their ability to generate thrombin *in vitro*.

Methods: VICs were obtained from explanted aortic valves after collagenase digestion. TF activity was measured with a commercial chromogenic assay under basal conditions and after stimulation with TNF-α (10-50 ng/ml; 16h). Thrombin generation capacities of VICs were analyzed using a Calibrated Automated Thrombogram assay. A dedicated software program enabled the calculation of thrombin generation over time. The area under the curve (ETP) represents the total amount of thrombin generated. The lag time is the time needed to achieve an explosive burst of thrombin.

Results: The isolated VICs express active TF. Basal TF antigen and activity varied among valves and were dose-dependently increased after stimulation with TNF-α. VICs were able to generate thrombin *in vitro*, proportional to the amount of cells used for the experiments. TNF-α stimulation led to a shorter lag time (12.6 min vs 10.8 min basal vs stimulated conditions) and increased both the maximal and total concentration of generated thrombin (peak: 141nM vs 116 nM; ETP:1034 nM/min vs 1179 nM/min; stimulated vs unstimulated).

Conclusion: We showed here for the first time that VICs express active TF and are able to generate thrombin *in vitro*. TF expression by VICs can be induced by TNF-α stimulation. The concentration of thrombin generated is proportional to the amount of cells and TF activity. These results strengthen our hypothesis that TF may play a role in aortic valve mineralization through thrombin generation.

183

Exercise pulmonary hypertension in asymptomatic severe aortic stenosis: determinant and impact on outcome

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Background: Pulmonary hypertension (PHT) in patients with severe aortic stenosis (AS) is associated with increased morbidity and mortality. In asymptomatic patients, the additive value of exercise (Ex) PHT is unexplored. We aimed to identify the determinants and impact on outcome of ExPHT in asymptomatic patients with severe AS.

Method and results: Asymptomatic patients with severe AS (n=106) and preserved left ventricular (LV) function were prospectively referred to exercise stress echo. Resting and ExPHT were defined as a systolic pulmonary arterial pressure (SPAP) >50 mmHg and >60 mmHg, respectively. Ex PHT was more frequent than resting PHT (55% vs. 6%, p<0.0001). Patients with ExPHT were more frequently male (p=0.035), had significant higher mean aortic gradient (p=0.04) and longer diastolic filling time (p=0.015) than those without ExPHT. ExSPAP was correlated with resting aortic mean pressure gradient and peak aortic velocity (r=0.49 and r=0.48, both p=0.01), with LV diastolic filling time (r=0.54, p=0.003) and the Ex-induced changes in E/Ea ratio (r=–0.53, p=0.007). Multivariate logistic regression analysis showed that only Ex-induced changes in E/Ea ratio (p=0.02) and resting peak aortic velocity (p=0.007) were independently associated with ExSPAP.

▶

ExPHT was associated with reduced cardiac event-free survival (27±7% vs. 53±9%, p=0.02). In multivariate Cox proportional hazard model, the independent predictors of events were resting E/Ea ratio (p=0.01), aortic peak velocity (p<0.0001), indexed left atrium area (p=0.005), LV global longitudinal strain (p=0.04) and ExPHT (hazard ratio=1.9, p=0.04). When adding Ex-induced changes in aortic mean gradient to the multivariate model, ExPHT remained an independent predictor outcome (p=0.033).

Conclusion: In asymptomatic patients with severe AS, the main determinants of ExPHT are the severity of AS and the Ex-induced changes in LV filling pressure. ExPHT is associated with 2-fold increased risk of cardiac events.

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184

Percutaneous mitral commissurotomy in the pregnant woman

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The mitral stenosis (MS) is the most common valvular disease in the Maghreb; young women of procreation age are most concerned.

Percutaneous mitral commissurotomy (PMC) has changed the prognosis of symptomatic MS of pregnant woman.

We report our experience on eighty-three patients requiring PMC during the third trimester of pregnancy, between March 1998 and May 2010.

Their mean age was 29±4, 9 years; the presumed age of pregnancy was 27.5±2.9 weeks of gestation. Fifteen were in New York Heart Association class II; fifty in class III and eighteen in class IV. Twelve patients with atrial fibrillation. Wilkins score calculated in all patients with an average 7±2.

No fetal deaths were noted after the procedure. 1 case of stroke, transient. No abortions occurred following the procedure.

We report a maternal death fifteen days after delivery. All patients have improved after the surgery at least one class of NYHA.

Mitral surface area and hemodynamic parameters improved significantly after PMC; mean left atrial pressure fell from 30±6.3 to 12.2±7 mmHg, mean transmitral gradient from 21±7.2 to 6.1±3.2 mmHg and mitral valve area from 0.8±0.15 to 2.15±0.2 cm^2.

During pregnancy the PMC is the treatment of choice of MS must be performed by an experienced team because the angle of the trans septal puncture is subject to changes in pregnant women.

185

New indices for prediction of the left ventricular ejection fraction after correction of an organic mitral regurgitation

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Objectives: This study analyzed the association between pre-operative rest echocardiography and the 6-month post-operative left ventricular ejection fraction (LVEF) in organic mitral regurgitation (MR).

Background: LV end-systolic diameter is the marker of LV function in patients with organic MR associated to survival and post-operative EF, but still some patients have nowadays a depressed post-operative LV EF despite correct diameters.

Methods: 88 patients (62.6±1.4 yo) were prospectively recruited. They all got a complete echocardiography including the assessment of LV-deformations before the MR repair and all had an echocardiography at 6-month after-surgery. Exclusion criteria were: coronary artery disease, other organic valvular disease, uncontrolled arrhythmia, hemodynamic instability.

Results: The principal parameters not correlated to post-operative LVEF (0.5±0.08) are displayed in table I. The univariate analysis concluded that: LV end-systolic diameter (36±0.7 mm, R=–0.34, p=0.009); Left atrial area (26.4±1.0 cm^2; R=–0.37, p=0.011); LV end-diastolic volume (149.9±5.2 ml; R=–0.31, p=0.019); LV end-systolic volume (52.3±2.5 ml; R=–0.35, p=0.003); Mitral annulus diameter (37±0.7 mm; R=–0.25; p=0.01). Using a multivariate linear regression, the GLS/LV end-systolic volume (–4.6±0.3; p=0.01) and the left atrial diameter (44.7±0.8 mm; p=0.01) were the best predictor of post-operative LVEF (R^2=0.22).

Conclusions: In organic MR, LV end-systolic diameter is a key parameter to propose surgery. We demonstrated that global longitudinal strain (GLS, %) normalized for the end-systolic volume is, with the LA size, an important determinant of post-operative EF.

Table – Main results

	mean±SE
Left atrial volume (ml)	44.7±0.8
LV end-diastolic diameter (mm)	55.9±0.9
LVEF (%)	66.2±0.8
LVOT VTI (cm)	17.3±0.5
Mitral inflow E-wave (cm/s)	91.8±5.9
S' mitral (lateral) (cm/s)	10.4±0.4
Tricuspid maximal velocity (m/s)	2.8±0.1

186

Impact of mitral regurgitation on exercise capacity and clinical outcomes in patients with ischemic cardiac dysfunction

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Background: There is uncertainty and debate regarding whether ischemic mitral regurgitation (MR) is a secondary epiphenomenon resulting from left ventricular (LV) dysfunction or confers an independent effect on exercise capacity and outcomes.

Objective: We tested whether ischemic MR negatively impacts exercise capacity, cardiovascular morbidity and mortality in patients with coronary artery disease (CAD) and inferior wall motion abnormality patients, independent of LV dysfunction.

Methods: Clinical follow-up over 5 years was obtained in 77 patients (age 64±10 years, LVEF 54±11%) with at least mild ischemic MR from CAD and evidence of inferior wall motion abnormality, who had exercise stress testing with perfusion imaging within 24 hours of echocardiography. Patients with active heart failure, ischemia, intrinsic valve disease, pulmonary and vascular disease were excluded. Exercise capacity (METs, peak double product) was tested for relation to MR (vena contracta (VC) and jet area), LV size and function, and pulmonary pressures. Cox proportional hazards analysis assessed whether MR predicted cardiovascular events, including hospitalization for heart failure, acute coronary syndrome, and myocardial infarction, and cardiovascular (CV) and total mortality.

Results: By multivariate analysis, independent predictors of functional capacity (METs and peak double product) were MR vena contracta (VC; r^2=0.62, p<0.0001) and LV end-diastolic volume (EDV; r^2=0.78, p=0.03). MR jet area contributed similarly (r^2=0.61, p<0.0001). MR VC >2 mm (moderate ischemic MR) and age were independent predictors of CV events and death (HR 6.72 for MR, p=0.04).